CLAIMS

What is claimed is:

1. A computerized method for synchronizing at least one variable among a plurality of members of a parent-child hierarchy based on data values exchanged between said plurality of members, wherein each member has a calculated value of the variable, said method comprising:

5   sending a first data value from a child to a parent of the child, said first data value representing a contribution to the variable from the child and any members subordinate to the child in the hierarchy;

updating, by the parent, a second data value with the received first data value, said second data value representing a contribution to the variable from all members other than

10   the parent;

transmitting a third data value from the parent to the child, said third data value representing a contribution to the variable from all members other than the child and other than any members subordinate to the child in the hierarchy; and

updating, by the child, a fourth data value with the transmitted third data value,

15   said fourth data value representing a contribution to the variable from all members other than the child.

2. The method of claim 1, wherein prior to sending a first data value from a child to a parent of the child, further comprising contributing, by the child, to the first data value by increasing the value of the variable as calculated by the child.

3. The method of claim 1, further comprising calculating, by the parent, a value of the variable by summing the second data value and the contribution to the variable from the parent.

4. The method of claim 1, further comprising calculating, by the child, a value of the variable by summing the fourth data value and the contribution to the variable from the child.

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5. The method of claim 1, wherein the specific variable is a counter.

6. The method of claim 1, further comprising maintaining, by the parent, an indicator for each child for each variable that has been updated independent of said child.

7. The method of claim 1, wherein a child sending, the parent updating, the parent transmitting, and the child updating occur during asynchronous synchronization events.

8. The method of claim 1, when the parent and child are connected via the Internet.

9. The method of claim 1, further comprising arranging a plurality of variables in partitions.

10. The method of claim 1, wherein the data values are 64-bit, unsigned integers.

11. The method of claim 1, further comprising initializing the variable for a specific member.

12. The method of claim 1, further comprising:

registering a specific member with another member to synchronize the variable, said other member being a parent of the specific member;

subscribing, by the registered, specific member to the variable stored by the parent; and

transmitting from the parent to the specific member at least one value relating to the subscribed variable to update a value of the variable stored by the specific member.

13. The method of claim 12, further comprising transmitting an error packet from the parent to the specific member if an error has occurred during registration or subscription.

14. The method of claim 12, wherein registering comprises:
transmitting a member identifier from the specific member to the parent; and
transmitting a unique token corresponding to the transmitted, member identifier from the parent to the specific member.

15. The method of claim 12, wherein subscribing comprises:
transmitting a variable identifier from the specific member to the parent; and
transmitting a unique token corresponding to the transmitted, variable identifier from the parent to the specific member.

16. The method of claim 12, wherein registering and subscribing operate from the specific member through one or more successive parents to a master parent at a root of the hierarchy.

17. The method of claim 1, wherein at least one member includes a plurality of processors, and further comprising optimizing access to memory by said plurality of processors.

18. The method of claim 17, wherein optimizing comprises providing a memory component for each processor.

19. The method of claim 18, wherein optimizing further comprises providing a cache line for each processor to access the provided memory component.

20. The method of claim 18, wherein optimizing further comprises each processor performing operations via the provided memory component to bypass access to a register.

21. The method of claim 18, wherein optimizing further comprises the at least one member calculating a value of the variable by accessing each memory component of the at least one member.

22. One or more computer readable media having computer-executable instructions for performing the method recited in claim 1.

23. A computer-readable medium having computer-executable components for synchronizing at least one variable based on values exchanged between a plurality of members of a parent-child hierarchy, said components for each specific member comprising:

5   an interface component for receiving a parent value from a parent of the specific member; and

an operator component for calculating an updated parent value in response to the parent value received by the interface component, wherein said updated parent value includes contributions to the variable from the specific member and any members

10   subordinate to the specific member in the hierarchy, said interface component transmitting the updated parent value to the parent of the specific member.

24. The computer-readable medium of claim 23, wherein the interface component further receives a child value from at least one child of the specific member.

25. The computer-readable medium of claim 24, wherein the operator component further calculates an updated child value in response to the child value received by the interface component, wherein said updated child value includes contributions to the variable from all members other than the child and other than any members subordinate

5   to the child in the hierarchy.

26. The computer-readable medium of claim 25, wherein the interface component further transmits the updated child value to the at least one child of the specific member.

27. The computer-readable medium of claim 24, wherein the interface component stores the received child value.

28. The computer-readable medium of claim 23, wherein the interface component stores the received parent value.

29. The computer-readable medium of claim 23 having further computer-executable components comprising a setup component for initializing a variable.

30. The computer-readable medium of claim 29, wherein the setup component includes a membership component for registering the specific member with the parent to synchronize a specific variable.

31. The computer-readable medium of claim 23 having further computer-executable components comprising an error component for recovering from failure by a member of the hierarchy.

32. A computer-readable medium having stored thereon a data structure for synchronizing at least one variable based on values exchanged between a plurality of members of a parent-child hierarchy, said data structure comprising for each specific member:

    5   a first field storing a calculated global value representing contributions to the variable from all members other than the specific member;

            a second field storing a local value representing contributions to the variable from the specific member; and

            a third field storing a parent value representing contributions to the variable as

    10   received from a parent of the specific member.

33. The computer-readable medium of claim 32, wherein said data structure further comprises one or more child value fields corresponding to one or more children of

the specific member, wherein each child value field stores a child value representing contributions to the variable as received from each of the one or more children of the

5   specific member.

34. The computer-readable medium of claim 32, wherein the global value, local value, parent value, and the child value are 64-bit, unsigned integers.

35. The computer-readable medium of claim 32, wherein the global value, local value, parent value, and the child value are set to zero.

36. A system for synchronizing at least one variable among members of a child parent hierarchy based on data values exchanged between said members, wherein each member has a calculated value of the variable, said system comprising:

means for a child to send a first data value to a parent of the child, wherein the
5   first data value represents a contribution to the variable from the child and any members subordinate to the child in the hierarchy;

means for the parent to update a second data value with the received first data value, wherein the second data value represents a contribution to the variable from all members other than the parent;

10   means for the parent to transmit a third data value to the child, wherein the third data value represents a contribution to the variable from all members other than the child and other than any members subordinate to the child in the hierarchy; and

means for the child to update a fourth data value with the transmitted third data value; wherein the fourth data value represents a contribution to the variable from all
15   members other than the child.

37. The system of claim 36, further comprising means for the parent to maintain an indicator for each child for each variable that has been updated independently of said child.

38. The system of claim 36, further comprising means for initializing the variable for a specific member.

39. The system of claim 36, wherein each member includes a plurality of processors, and further comprising means for optimizing access to memory by said plurality of processors.

40. A computer-readable medium having computer-executable components for delivering one or more advertisements and tracking run-time capacity for each advertisement, said computer-readable medium associated with at least one server wherein each server is a node in a tree structure, said components comprising:

5   a transaction component for delivering the advertisements; and
           a maintenance component for counting each advertisement delivered by the transaction component and synchronizing the count for each delivered advertisement among each node in the tree structure.

41. The computer-readable medium of claim 40, wherein the maintenance component comprises:
           an interface component for receiving a parent value from a parent node of a specific node and receiving a child value from at least one child node of the specific

5   node; and
           an operator component for calculating an updated parent value in response to the parent value received by the interface component, wherein said updated parent value includes contributions to at least one count from the specific node and any nodes subordinate to the specific node, said operator component further calculating an updated

10 child value in response to the child value received by the interface component, wherein said updated child value includes contributions to at least one count from all nodes other than the child node and other than any nodes subordinate to the child node in the hierarchy, said interface component transmitting the updated parent value to the parent node of the specific node and transmitting the updated child value to the at least one child

15 node of the specific node.